AMENDMENTS TO THE SPECIFICATION WITH MARKINGS TO SHOW CHANGES MADE

Delete particulars before the title.

Change the title to read: -- METHOD AND APPARATUS FOR CONTROL AND LOCATION OF AN INSTRUMENT OR APPLIANCE--

Before paragraph **[0001]**, add the heading --BACKGROUND OF THE INVENTION--.

Before paragraph **[0004]**, add the heading --SUMMARY OF THE INVENTION--.

After paragraph **[0053]**, add the following headings and paragraphs:

-- BRIEF DESCRIPTION OF THE DRAWINGS

[0054] The present invention will be more readily apparent upon reading the following description of embodiments of the invention with reference to the accompanying drawing, in which:

[0055] FIG. 1 is a sectional view of an apparatus embodying the subject matter of the present invention;

[0056] FIG. 2 is a schematic block diagram showing the relationship of components of the apparatus;

[0057] FIG. 3 is a sectional view of a variation of the apparatus according to the present invention;

[0058] FIG. 4 is a sectional view of yet another variation of the apparatus according to the present invention;

[0059] FIG. 5 is a sectional view of still another variation of the apparatus according to the present invention;

[0060] FIG. 6 is a perspective view of a magnet assembly for use in the apparatus according to the present invention;

[0061] FIG. 7 is a schematic illustration of a variation of the apparatus of FIG. 4;

[0062] FIG. 8 is a schematic illustration of an instrument for use in the apparatus according to the invention;

[0063] FIG. 9 is a schematic illustration of another instrument for use in the apparatus according to the invention;

[0064] FIG. 10 is a schematic illustration of yet another instrument for use in the apparatus according to the invention;

[0065] FIG. 11 is a schematic illustration of still another instrument for use in the apparatus according to the invention;

[0066] FIG. 12 is a schematic illustration of another magnet assembly for use in the apparatus according to the present invention; and

[0067] FIG. 13 is a schematic illustration of a variation of another apparatus embodying the subject matter of the present invention.

DETAILED DESCRIPTION OF THE DRAWINGS

[0068] Turning now to the drawing and in particular to FIG. 1, there is shown a sectional view of an apparatus embodying the subject matter of the present invention for determining location and control of a body, an appliance or instrument, generally designated by reference numeral 1 and defining a

longitudinal axis L. For sake of simplicity, the following description relates to instrument only. Disposed in the instrument 1 is a magnet 2 which is rotatable about a rotation axis R, as indicated by arrow 3, and whose moving magnetic field is measured on three spatial axes. The rotation axis R extends hereby in spaced-apart parallel relationship to the longitudinal axis L of the instrument 1. Thus, the magnet 2 produces a magnetic moment m which is perpendicular to the longitudinal axis L. Data (amplitude, relative phase of the magnetic field components, axial field grading) of each spatial co-ordinate point in the magnetic field can be determined exactly. A three-axis magnetometer, such as a flux gate sensor, which is suitable for three-dimensional measurement may be used for this purpose. The magnet 2 may also be implemented as permanent magnet, for example a permanent magnet in the form of a rod, or alternatively an electromagnet may be used as the magnet 2. The magnetic field is measured by a receiver 4, indicated schematically on top of FIG. 1, for detecting the three time-dependent magnetic field components Hx(t), Hy(t) and Hz(t).

[0069] FIG. 2 is a schematic block diagram showing the relationship of components of the apparatus for determining the location of the instrument 1, the direction of the instrument axis or feed axis and the roll angle of the instrument 1 can be displayed via a connected evaluation unit 4 on a display 5, with the aid of the determined data.

[0070] FIG. 3 is a sectional view of a variation of the apparatus according to the present invention. Parts corresponding with those in FIG. 1 are denoted by identical reference numerals and not explained again. The description below will center on the differences between the embodiments. In this embodiment, the rotation axis R of the magnet 2 is in coincidence with the longitudinal axis L of the instrument 1.

[0071] FIG. 4 is a sectional view of yet another variation of the apparatus

according to the present invention in which the magnet 2 is driven by a separate drive M independently of the instrument axis L. This drive M may be provided electrically, for example by a battery or by a controllable electric motor; alternatively, it can also be provided by hydraulic means of a liquid flowing through the instrument 1, for example a cooling liquid, or a gas, as shown in FIG. 5.

[0072] FIG. 6 is a perspective view of a magnet assembly 2 for use in the apparatus according to the present invention. The magnet assembly 2 includes three magnets 2a, 2b, 2c, of which the magnet 2a is moveable in relation to the other magnets 2b, 2c by a driver at a specific roll angle. As a result of this reproducible deflection of the magnet 2a from its rotation axis R, it is possible to temporarily interrupt the rotation of magnet 2a by means of a coupling 7 disposed between the drive M and the magnet 2, as shown in FIG. 7. A further option is to vary the amplitude of the magnetic field by means of shielding which is dependent on the roll angle.

[0073] Referring now to FIG. 8, there is shown a schematic illustration of an instrument 1 which is provided with one or more openings 8 (only one opening 8 is shown here) for emission of a liquid. As a result, therapeutic substances, such as cytostatica for tumor therapy, in liquid or dissolved form, can be released as accurately as possible. If the magnet 2 is driven by the liquid flow, it is also possible to measure the flow rate and emission rate of the solution. As shown in FIG. 9, the instrument 1 contains a device for production or emission of light beams, laser beams, radioactive beams, sound waves or ultrasound waves. In FIG. 10, the instrument 1 contains a device 9 for recording optical images or ultrasound images. This allows diagnosis in body cavities, digestive tract and vessels. It is also possible to provide the instrument 1 with a device for emitting or recording of electrical pulses and data, as shown in FIG. 11

[0074] FIG. 12 is a schematic illustration of another magnet assembly,

generally designated by reference numeral 2, to measure the position and movement of the instrument 1 (not shown here) exactly and at an accurate time, i.e. in "real time". The use of two or more transmitters and/or receivers 4a, 4b also makes it possible to record complex signals, which can indicate the position of different instrument points.

[0075] Referring now to FIG. 13, there is shown a schematic illustration of a variation of another apparatus, involving the arrangement of a magnetic field sensor 10 which is mounted in the longitudinal axis L of the instrument 1, and a magnet 2 which is outside of the instrument separate from the longitudinal axis L.--.

Page 13, after the heading "CLAIMS" and before the first claim add --What is claimed is:--.